Semantic Web concepts used in Web 3.0 applications

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Abstract - *The human mind can only grasp natural language, but a computer can only comprehend digital data in the form of 1s and 0s. There are only two ways to develop a single, shared vernacular for both machines and people: Either educate mankind how to think in binary, or create a machine to understand natural language. The former of these two choices is impractical since the typical human brain is not sufficiently developed to carry out such a task. As a result, there is intense study being done on the drive to teach a computer to understand natural language. This idea is first being applied on a big scale on the Internet due of the huge volume of data that is available. This necessitates the conversion of the present Web 2.0 to the future Internet, often known as Web 3.0 or Semantic Web. The Semantic Web's potential applications are a hot topic of study, despite the fact that it is still in the early phases of development. This essay addresses strategies for integrating the benefits of the Semantic Web into the Internet's current system of several domains.*

***Key Words*: Semantic Web, Web 3.0, Medical care, E Learning, Search Engine.**

1. INTRODUCTION

A technology that "provides a common foundation that permits data to be shared and reused across application, corporate, and community boundaries" is what the World Wide Consortium refers to as semantic web. Semantic Web is the next development in machine learning given the current passion for artificial intelligence. The purpose of the Semantic Web is to build a web of related data from which a computer can skillfully extract and analyse the relevant data. Today's Internet is designed for usage by people rather than computers. Accordingly, even if a computer can view a movie, play a song, and read a web page, only a person will be able to understand the information inside. In addition to providing an answer, Semantic Web promises to link with the doctor's availability calendar to schedule a dental appointment. The document-centric internet of today would change to a data-centric Web of Data type of internet thanks to the Semantic Web. Since research is still in its early stages, as mentioned in Paper 11, there are a number of issues with putting the Semantic Web into practise. Additionally, the same is applied in an equal number of other instances. Therefore, we must reduce the downsides until the range of applications outweighs the Semantic Web's limitations.

The objective is to combine all of this into a single framework so that consumers are given information that is both accurate and only essential.

Resources Description Framework (RDF), SPARQL Protocol and RDF Query Language (SPARQL), Web Ontology Language (OWL), and Simple Knowledge Organization System are among the technologies used by the Semantic Web (SKOS). These have all been utilised independently, with a focus on how each will be used to develop Semantic Web services.

2. MEDICAL SCIENCES

The usage of Semantic Web in Medical Science will be its most significant application. The fact that biomedical data must be merged from multiple unrelated sources presents the largest barrier.

For instance, it would be advantageous to have access to and the ability to combine all knowledge on the links between genes, proteins, vitamins, tissues, activities of organs, cells, and chemical processes when medical discoveries need to be produced [1]. This is feasible because to semantic web. Another useful source of information is offered by [2], which introduces the Dartgrid, a framework for application development that combines a set of semantic tools with semantic web technologies to make it easier to integrate heterogeneous relational databases. This interface uses Dynamic Semantic Query.

[3] demonstrates how Ann, a neurology researcher, will be able to do several things related to her study at simultaneously. She will have to go through a sizable quantity of data when writing a research paper, manually summarise them, gather all the relevant data for her study, re-enter data elsewhere, and perhaps even correlate topics that don't appear to make any sense at all. The next section of the article discusses a "Paper Writing Workspace" that was conceptually created to help the author handle this massive amount of data as well as other personal tasks and email alerts simultaneously. The document also demonstrates the numerous changes made from the original workspace to the final one, the latter of which features a variety of layout requirements, menus, choices, and other buttons and keys to tailor the window to her particular requirements. The Semantic Web's brilliance lies in this.

A structured database can hold all of a patient's records. Based on the patient's medical history, this might aid in disease detection. Patients may also be given medication depending on their prior medical histories. Diagnosis is a crucial stage that the semantic web may help with.

Users may record their illnesses, and semantic web can help identify the underlying causes using patient histories, histories of individuals with comparable illnesses, and a redesigned database of symptoms and disorders. One intelligent system that employs a comparable mechanism is Clinithink.

Websites with a single interface that map various medical data together are available[4]. This objective of combining data from many sources will be accomplished with the aid of RDF, OWL, and each of the Semantic Web's component pieces. By fusing metadata and ontology, it develops a vocabulary to connect various types of medical data and brings them together on a single platform.

The translation and use of imaging to non-imaging biological data is a challenge. According to [5], a method for medical image annotation involves observing the many properties of a picture (like size, density, length, breadth, etc.). The imaging system's database is then used to compare this. For instance, the densities of various bodily tissues vary. The picture of these tissues will also. This comparison enables us to successfully employ photos during medical research in terms of their semantic content.

On the Web, the current increase in knowledge, particularly in the field of biology, is increasing quickly. Due to the notion of e-Science being established as a result, the Internet has been semantically rebuilt to meet the expanding demands of biomedical researchers.

3. SEARCH ENGINE

The goal of modern search engines is to quickly index the pages with the most "hits" possible. We are unsure of the relevance of these "hit" sites to the search query. Depending on the request provided by each user, we may leverage the Semantic Web technology to generate coherent results.

Swoogle is one such search engine that was created [10][11][12]. One of the earliest metadata and search engines for the semantic web is swoogle. It has a data-centric design and is extendable, allowing the various parts to operate independently and communicate with one another via the database. In a semantic document, RDF triplets are used to tag every sentence. These three twins Swoogle employs the concept of "rank" to determine each Semantic document's significance. to be utilised later in the search engine. On the output screen, pages based on "rank" may be shown in this fashion. The proposed "Swoogle" search engine is semantically designed and has three tasks: • Choosing the right ontology

Finding instance data; defining the semantic web; and identifying it. These tasks are carried out by four independent components: interface, metadata development, data analysis, and Semantic Web Document (SWD) discovery. [10] Four functions—discovering, digesting, analysing, and serving—can also be used to describe this. In the first phase, the system continuously updates itself with information on the many SWDs that are accessible online. The next step is to construct metadata at the semantic and syntactic levels by storing snapshots of the SWDs' objective information. Swoogle recently found 346,126 RDF pages containing 65,747,150 triples. While this figure is still insignificant in contrast to Google's index of 8,058,044,651 web pages, it is a significant quantity for semantic web researchers [11].

Utilizing the "context" of the web pages is the next step to evaluate the quality of the findings. In order to do this, the Web of Belief (WOB) is built and then modelled in the agent world, the RDF graph world, and the web. Through custom web interfaces, the service component supports both software and human agents.

4. E LEARNING

One area that is seeing daily rapid development is e-learning. An open, intelligent learning environment must be established as one of the primary conditions for an ELearning system to succeed.

A framework for the Semantic Web architecture is summarised in order to realise sophisticated eLearning techniques. Additionally, a variety of problems with adopting semantic Web technologies for e-learning have been explored. The study concludes by discussing the model and outlining all the potential future developments [6]. and flavours. Even better, these preferences should be based on prior experiences. Every observation made about a student's learning process should be recorded, and the system should be able to simulate the learner's present profile [7]. In this manner, it may even recommend potential courses to each student.

When it comes to learning, there are three distinct phases: pre-learning, learning, and post-learning. A semantically built E-learning system uses each of these steps so that the computer may discover what each student is interested in. Using tools like Learning Object Metadata (LOM), Sharable Content Object Reference Model (SCORM), Learning Design, and other pedagogical studies in semantic e-learning, [8] explains this approach.

It is also possible to incorporate a web-based learning system like the one recommended by [9]. Learning services and assessment services make up the first division of a learning system's content. A teacher is able to upload files in a variety of formats. Utilizing assessment services,